

To: Macler, Bruce[Macler.Bruce@epa.gov]
Cc: Li, Corine[Li.Corine@epa.gov]
From: Rao, Kate
Sent: Tue 8/11/2015 7:15:08 PM
Subject: silicon valley advanced water purification center tour

Bruce – thanks. Still working on logistics. We get something out shortly.

Kate

Kate Rao
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From: Macler, Bruce
Sent: Tuesday, August 11, 2015 11:31 AM
To: Rao, Kate
Cc: Li, Corine
Subject: RE: Gold King Mine Spill - brief background and initial EPA Region 9 response
(internal - do not release)

Hi Kate,

I can go on the Aug 18 tour, though have seen it several times already. Know the folks quite well by now.

Are there travel plans made?

Bruce

415 972-3569

seneca

From: Rao, Kate
Sent: Tuesday, August 11, 2015 11:00 AM
To: Macler, Bruce
Subject: RE: Gold King Mine Spill - brief background and initial EPA Region 9 response (internal - do not release)

Bruce – there is more monitoring information but you should get it from Bessie or Corine.

On another note, will you be able to participate in the Aug 18 tour to Silicon Valley Advanced Water Purification Center? I took over the organization of the event since Kevin is deployed to Saipan. Jared is planning to accompany us on the tour and I want to make sure we have staff there that can engage with him and answer questions he may have.

Thanks. Kate

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From: Macler, Bruce
Sent: Tuesday, August 11, 2015 10:55 AM
To: Rao, Kate
Subject: RE: Gold King Mine Spill - brief background and initial EPA Region 9 response (internal - do not release)

Hi Kate,

Do we have other monitoring information besides what was in the article?

Thanks,

Bruce

Bruce A. Macler, PhD

Water Division Toxicologist

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From: Rao, Kate

Sent: Tuesday, August 11, 2015 10:37 AM

Subject: Gold King Mine Spill - brief background and initial EPA Region 9 response (internal - do not release)

Dear Water Division Colleagues:

Below is some background information and initial steps that EPA Region 9 is taking to respond to the Gold King Mine spill. Approximately 3 million gallons of mine wastewater/drainage/sludge was released from a dormant mine (Gold King) and flowed into Cement Creek which is a tributary of Animas River. The Animas River connects with the San Juan River which is a source of drinking water for the Navajo Nation. The plume reached the Navajo Nation on Saturday (August 8th).

August 5, 2015: An EPA team working to investigate and address contamination at the Gold King Mine in San Juan County, Colorado, unexpectedly triggered a large release of mine waste water into the upper portions of Cement Creek. Initial estimates are that the release contained approximately one million gallons of water that was held behind unconsolidated debris near an abandoned mine portal. There were several workers at the site at the time of the breach, all were unharmed.

August 8, 2015: Two EPA Region 9 community involvement coordinators (CICs) arrived in Farmington, NM to ensure comprehensive outreach to all affected Navajo Chapters. Russell Begaye, President of the Navajo Nation, declared a State of Emergency for the San Juan River Valley.

August 9, 2015: EPA Region 9 deployed an on scene coordinator to the Durango Incident Command Post and public information officer to participate in a joint information center (JIC). EPA PIO (Rusty Harris-Bishop) escorted President Begaye and his staff on a tour of the Gold King Mine Site. A community meeting was held in Durango.

The Navajo EPA surface water monitoring program (Shiprock Office) collected water and sediment samples from the San Juan River - prior to the spill impact. Region 9 has provided contractors to coordinate and conduct increased sample collection and lab analysis in conjunction with NNEPA. This joint EPA/NNEPA river sampling program has commenced focusing on the San Juan between Shiprock/Hogback, NM area and Mexican Hat, UT and will continue for the foreseeable future.

NNEPA and USEPA drinking water experts agreed to inventory and assess water sources including private wells and intakes.

Region 9 will be providing assistance to Navajo NTUA (utilities) to deliver water to the areas impacted by the Gold King Mine Spill.

August 10, 2015: EPA Region 9 has sent Bessie Lee, drinking water subject matter expert, to the Navajo Nation to support the spill response efforts.

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Other Resources:

USEPA Region 8: Gold King Mine Release Emergency Response

On Scene Coordinator web page: Gold King Mine Release Incident

High Country News Article:

When our river turned orange

Nine things you need to know about the Animas River mine waste spill.

Jonathan Thompson Aug. 9, 2015 Web Exclusive

"The question that is crowding upon Durango thick and fast is one of water. The mill slimes from Silverton are now reaching us."

-- Durango Democrat, 1899

On a scorcher of an August afternoon, a crowd gathered on a bridge over the deep-green waters of the Animas River on the north end of Durango, Colorado. A passerby might have thought they were watching a sporting event, perhaps a kayak race or a flotilla of inebriated, scantily clad inner tubers. Yet the river that afternoon was eerily empty of rowers, paddlers or floaters — unheard of on a day like this — and the mood among the onlookers was sombre. One mingling in the crowd heard certain words repeated: sad, tragic, angry, toxic.

They were here not to cheer anyone on, but to mourn, gathered to watch a catastrophe unfold in slow motion. Soon, the waters below would become milky green, then a Gatorade yellow, before finally settling into a thick and cloudy orangish hue — some compared it to mustard, others Tang. Whatever you called it, it was clearly not right.



The river turned a mustard-Tang color as the wastewater moved through. This was taken about 24 hours after the spill.

Jonathan Thompson

The mustard-Tang plume was the result of approximately three million gallons of wastewater and sludge that had poured from the dormant Gold King mine into Cement Creek, a tributary of the Animas, some 50 miles upstream on the previous morning. The water had backed up in the mine behind a sort of dam formed when the mine portal's ceiling had collapsed sometime earlier. Workers from the Environmental Protection Agency were hoping to install a pipe to drain the water so that they could eventually plug the mine, keeping the contaminated water inside it and out of the streams. Instead, they ended up accidentally breaching the dam, releasing the water.

While the spill occurred just a few miles above Silverton, the impacts hit Durango the hardest. The Animas River courses through the middle of Durango, provides a portion of its drinking and irrigation water, and over the last few decades has become the recreational and aesthetic, wild, green heart of the city. The spill essentially stopped the heart's beat. Officials closed the river for

public health reasons, shutting down hundreds of recreational boaters and tubers, not to mention the local rafting industry. No one yet knows what will happen to the fish, the birds, the bugs and other wildlife that call the river home.



The Animas River was closed for public safety as the wastewater plume moved through town.

Jonathan Thompson

“I’m very sorry for what happened,” said David Ostrander, EPA’s emergency response director, at a public meeting in Durango held just hours after the plume reached town. “This is a huge tragedy. We typically respond to emergencies, not cause them.”

Really, though, the EPA wasn’t the root cause of the emergency. It was, most likely, a disaster waiting to happen and the most visible manifestation of an emergency that’s been going on in the Upper Animas River Watershed for decades. Here’s nine items to help you understand the big picture:

- **Pollution in the Animas is not new:** The Upper Animas River watershed consists of three main streams, the Animas, Cement Creek and Mineral Creek all of which drain the Silverton Caldera, the highly mineralized collapsed core of an ancient volcano, and which run together at Silverton. Miners started going after the minerals in the 1870s, and the river’s been the victim of their pollution ever since. Mines simply poured their tailings directly into the creeks and rivers until, in the 1930s, downstream farmers got them to stop; the remnants of those releases can still

be found under the river bed in Durango and beyond. Then there's acid mine drainage. The portals and shafts blasted into the mountainsides hijack the natural hydrology, pulling water flowing through fractures toward natural springs into the mine tunnels. There, the water reacts with iron disulfide (pyrite) and oxygen to form sulfuric acid. The acidic water dissolves naturally occurring heavy metals such as zinc, lead, cadmium, copper and aluminum. The resulting contaminated water flows out of the mine adit as if from a spring. By 1991, when the last major mine in the watershed shut down, there were some 400 mines in the watershed, many discharging unmitigated discharges into streams. Not a fish could be found for miles downstream from Silverton, and the impacts to aquatic life were felt in Durango, where, when the mines were still running, sensitive fish were unable to reproduce.

• **Superfund has long been on the table, and long been swept off:** As mining waned in the late 1980s, federal and state regulatory agencies started looking at how to clean up the mess. Superfund, which comes with a big pile of cash, seemed like the obvious approach. But locals feared that the stigma would destroy tourism along with any possibility of mining's return. Besides, Superfund can be blunt; the complex Animas situation demanded a more surgical, locally-based approach. So the Animas River Stakeholders Group, a collaboration between concerned citizens and representatives from industry and federal and state agencies, was created in 1994 to address the situation. The approach was successful, at first, but then water quality began deteriorating again. The specter of Superfund returned. Many locals, worried about impacts to property values and tourism, have again resisted. Sunnyside Gold Corp. (see below) has offered millions of dollars to further cleanup efforts -- as long as there's no Superfund designation.



The Gold King Mine (bottom of picture) and Cement Creek. Cement Creek has probably never supported fish, and even before the spill had a pH level of about 3.5, on par with Coca-Cola.

Jonathan Thompson w/ the help of EcoFlight

• **The problem is massive and complex, but not hopeless:** In 1991, the last big mine in the region, the Sunnyside, shut down. Its owner, Sunnyside Gold Corp., planned to plug the American Tunnel, thus stanching the flow of acid mine drainage (which it ran through a water treatment plant), and then walk away. The state wouldn't allow it: While a plug, or bulkhead, would be a short-term fix, in the long-term the water, and its contaminants, might back up in the mine and find another way to the surface. So Sunnyside agreed not only to bulkhead its mine, but also to clean up abandoned mines nearby -- a sort of pollution offset project -- while continuing to run the waters of upper Cement Creek through a water treatment facility. That, combined with the ARSG's extensive efforts, worked: By the early 2000s, zinc, cadmium and lead levels in Mineral Creek had dropped by 50 to 75 percent, and water quality in the Upper Animas had improved significantly (Cement Creek had never supported fish, and never will). Fish appeared just below Silverton, where they hadn't been seen in probably a century. It was success, without Superfund.

• **Then it got even more complex:** Sunnyside cut a deal with the state and Gold King mining, a small operation owned by a Silvertonian. Sunnyside would leave, and turn over its water treatment operations to Gold King, along with enough cash to keep it running for a while. Gold King hoped to eventually resume mining the Gold King (not far from the American Tunnel). For decades, the Gold King, like the nearby Red and Bonita mine, had not discharged any water. But not long after Sunnyside sealed its bulkheads, water started pouring out of all of them. "It was not a coincidence," says Peter Butler, ARSG co-coordinator. The backed up water had found natural fractures to follow into the other mines. Together, the Gold King and Red and Bonita would become some of the biggest polluters in the basin. Initially, their waters were run through the treatment plant that Sunnyside had left behind. But before long, Gold King ran into technical, financial and legal troubles and the treatment plant stopped operating. Water quality for miles downstream once again deteriorated. The fish that had returned to the Animas below Silverton were wiped out. Part of the renewed impetus for a Superfund designation was to bring in funds to resume water treatment as well as figure out ways to clean up the basin's remaining major polluting mines.

• **In the meantime, a piecemeal approach continues:** The ARSG, along with federal and state agencies, continue to do what they can to clean up mines. In some cases, this means plugging them, which is what the EPA is working on at the Red and Bonita, and planned to do at the Gold King, when the dam broke. Other methods include diverting water before it gets into the mine in the first place, and removing waste piles at the entrances to mines so that acidic discharge from the mine can't leech minerals out of the rock. Until the Gold King is plugged, it will continue to discharge acid mine drainage, just as it had before the spill.

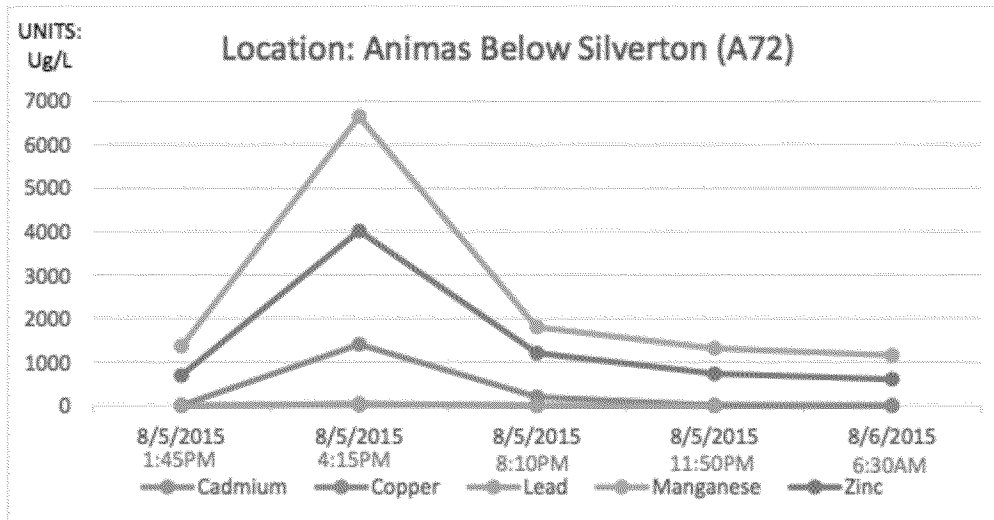
• **This isn't the first time that something like this has happened, nor is it the worst:** In June of 1975, a huge tailings pile on the banks of the Animas River northeast of Silverton was breached, dumping tens of thousands of gallons of water, along with 50,000 tons of heavy-metal-loaded tailings into the Animas. For 100 miles downstream, the river "looked like aluminum paint," according to a *Durango Herald* reporter at the time; fish placed in a cage in the water in Durango all died within 24 hours. It was just one of many breaches of various magnitude. Just a decade before, the same tailings pile was found to be spilling cyanide-laced water into the river.

In 1978, after the American Tunnel was bored Sunnyside Mine workings got too close to the floor of Lake Emma, the lake burst through, sending an estimated 500 million gallons of water tearing through the mines, sweeping up huge machinery, tailings and sludge, and blasting it out the American Tunnel and sending it downstream. No one was working in the mine at the time, which is either miraculous, or suspicious, depending on who you ask.



A 1975 tailings pile breach just above Silverton sullied the Animas River for 100 miles downstream, turning the water the color of "aluminum paint" and killing fish.

• **Short-term impacts aren't as bad as the water looks:** Sampling done by the [EPA](#) upstream from Durango show that the plume's peak put the Animas River's water's acidity on par with black coffee, and contained elevated levels of iron, manganese, zinc and copper. But by the time it reached town, the acidity had been diluted significantly, and levels of those metals were far lower, but still "scary," according to EPA officials. Still, the plume moved through quickly, lessening harm. A test by Colorado Parks and Wildlife, in which trout in cages were placed in the river prior to the plume's arrival, has so far shown no acute effects: Only one of 108 fish had died during the first 24 hours in contaminated water. Meanwhile, the [Mountain Studies Institute](#) has been monitoring macro-invertebrates, and their results have been similarly positive.

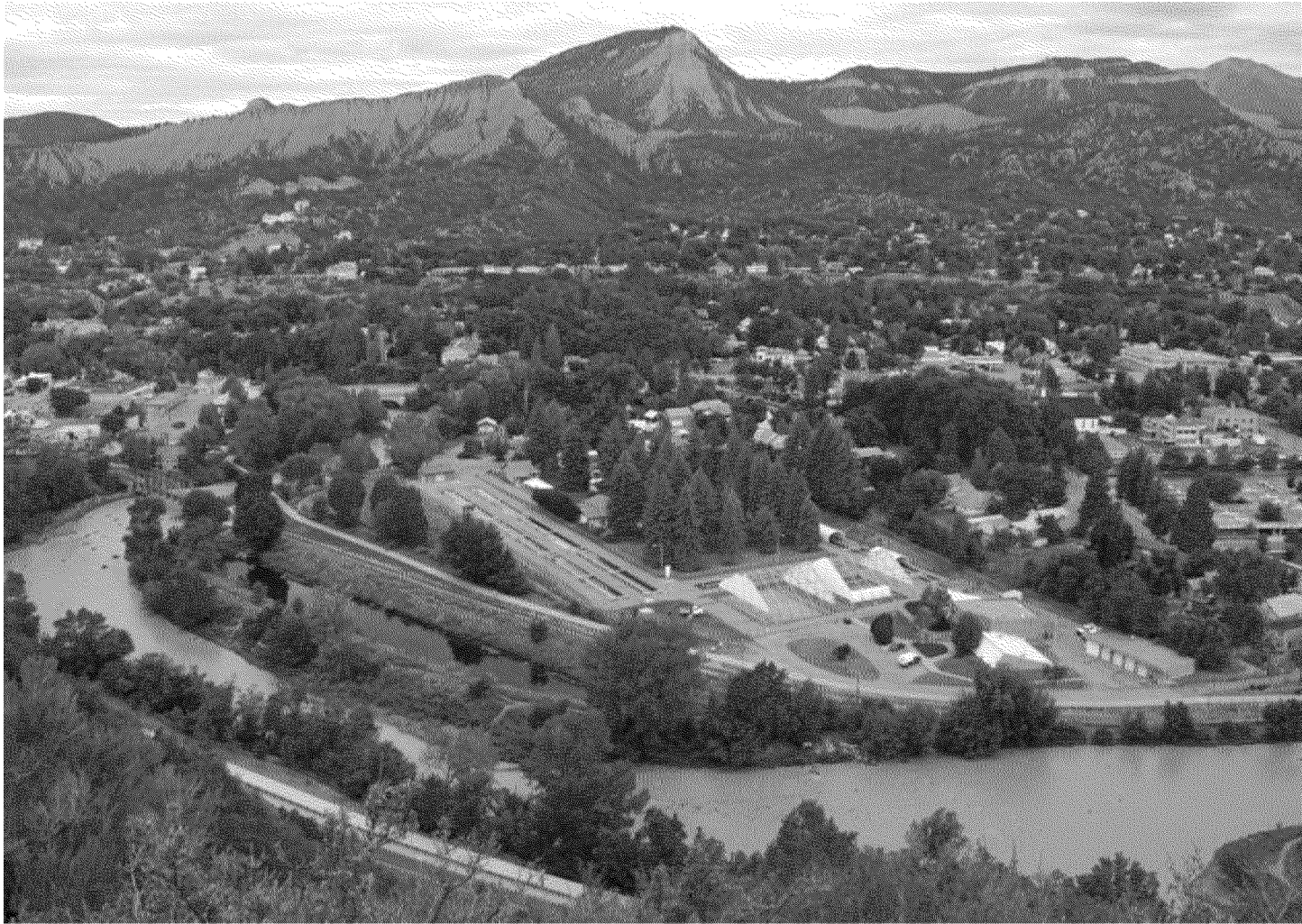


Samples taken by the EPA as the plume moved through show that it has high levels of heavy metals.

Environmental Protection Agency

• **Long-term impacts are still unknown:** As the plume moved downstream, sediment settled onto the river bottom and its rocks, which could affect aquatic bugs. And it's likely to get kicked up during high water flows. If thick enough, the sediment could even affect the river's appearance, providing a Tang-colored reminder of this disaster for months to come. Also, water in some domestic wells near the river reportedly had a yellow tint in the days after the spill moved through, but it's not yet known what other contaminants may have gotten into the water. Irrigators had to shut down their ditches in hot weather, which could damage crops, and the ag economy, just as the river closure is costing rafting companies thousands of dollars each day. The plume moved through critical habitat for razorback suckers and pike minnows further downstream; they may prove more sensitive than the trout. But then, the Animas and San Juan rivers in New Mexico had their own water quality issues before the spill: alarmingly high levels of human fecal bacteria.

• **The EPA messed up, but they're not the root cause:** It's true that EPA officials took a "cavalier attitude" (EPA Region 8 administrator Shaun McGrath's word) in the first hours after the spill, downplaying the impacts and failing to notify those downstream. And they admit that before tinkering with the mine, they should have taken better steps to mitigate a possible disaster, such as drilling into the mine from the top to assess the situation without the danger of busting the dam. Had they not messed with it at all, though, the gathering water and sludge might have busted through the de facto dam sometime anyway. Clearly, the water quality issue goes far deeper than this one unfortunate event.



The contaminated Animas River as it runs through Durango. Note the contrast between the river and a fish hatchery pond next to it.

Jonathan Thompson

If initial public reaction is any indication, the disaster has woken Durangoans up not only to how important the river is, but also to what's been going on upstream. And they're likely to exert whatever pressure they can on their neighbors up in Silverton to accept, even embrace, Superfund and a comprehensive cleanup effort. They speak from experience: Durango was the site of a massive federal cleanup of a uranium tailings pile in the early 1990s, and tourism and property values did just fine. Moab, Utah, another tourism mecca, is currently in the middle of a similar cleanup. The hordes of visitors mostly seem oblivious to it. Such is not the case, however, with our Tang-hued river.

Jonathan Thompson is a senior editor of High Country News.

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